

### Abstract of the Disclosure

A method of low-temperature nitridation of a silicon substrate includes placing a silicon wafer in a vacuum chamber on a heated chuck; maintaining the silicon wafer at a temperature of between about room temperature and 400 °C; introducing a nitrogen-containing gas into the vacuum chamber; dissociating the nitrogen-containing gas into nitrogen with a excimer lamp and flowing the nitrogen over the silicon wafer; and forming an silicon nitride layer on at least a portion of the silicon wafer.